Background Essay: Is It Alive?

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It is pretty clear to most people, even very small children, that icicles are not alive. They are cold to the touch; they don't move, except to drip or to fall to the ground when they break; they don't reproduce. At the opposite end of the spectrum, it is also clear that household pets and human friends are alive, especially when you see them run, jump, or respond to you. Those are fairly easy examples. But what about a clock or a seed? Are these things living or nonliving, and how can you tell?

You know that a clock is nonliving, right? But its hands move, it makes noise, and it responds when you turn its dials or press its buttons. That's more lifelike than an icicle, isn't it? And what about a seed? Even though we're told that it holds the potential for life, it looks about as lively as a stone. As you can see, the distinction between living and nonliving is not always clear-cut. Some inanimate objects have characteristics of living organisms, while many living organisms, on the face of it, seem utterly lifeless.

So how does one distinguish between living and nonliving things? First of all, the scientific definition of *living* includes those things that are alive or have ever been alive -- including what's left of a tree that died years before. Likewise, the seed, which appears lifeless and can remain dormant for years before finally germinating under the right environmental conditions, qualifies as living. In contrast, *nonliving* things are not alive, nor have they ever been.

But what does it mean to be alive? According to biologists living organisms are characterized by seven "signs of life": 1) living things have highly organized, complex structures; 2) living things maintain a chemical composition that is quite different from their surroundings; 3) living things have the capacity to take in, transform, and use energy from the environment; 4) living things can respond to stimuli; 5) living things have the capacity to reproduce themselves; 6) living things grow and develop; and 7) living things are well-suited to their environment.

Characteristics of living things:

http://utahscience.oremjr.alpine.k12.ut.us/sciber00/7th/classify/living/2.htm

It is not always an easy thing to tell the difference between living, dead, and non-living things. Prior to the 1600's many people believed that nonliving things could spontaneously turn into living things. For example, it was believed that piles of straw could turn into mice. That is obviously not the case. There are some very general rules to follow when trying to decide if something is living, dead, or non-living. Listed here are the six rules used by scientists:

- Living things are made of cells.
- Living things obtain and use energy.
- Living things grow and develop.
- Living things reproduce.
- Living things respond to their environment.
- Living things adapt to their environment.

If something follows one or just a few of the rules listed above, it does not necessarily mean that it is living. To be considered alive, an object must exhibit **all** of the characteristics of living things. Sugar

crystals growing on the bottom of a syrup container is a good example of a nonliving object that displays at least one criteria for living organisms.